

# ADVANCED MODULAR INCOHERENT SCATTER RADAR (AMISR)

## Management Perspective

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SRI International



# Advanced Modular Incoherent Scatter Radar (AMISR)





# AMISR building blocks

- **Face**
  - **Support structure**
    - Decking
    - Stairways
    - Cable trays
      - Power cable
      - RF cable
      - Fiber cable
  - **128 panels**
    - 128 panel controllers
    - 128 panel harnesses
    - 768 splitters/combiners
    - 4,096 antenna element units
  - **2 Utility distribution units**
    - 8 PMCUs
    - 16 CPDUs
    - 16 HPTUs
    - 16 power converters
  - **Data acquisition system**





# AMISR building blocks ...



**AMISR Face**



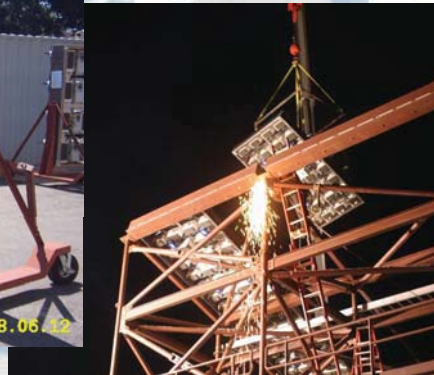
**Support structure**



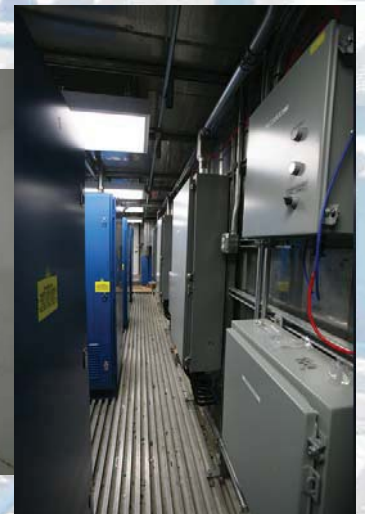
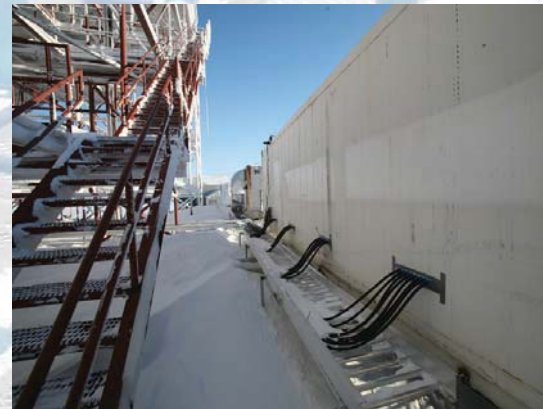
**4,096 antenna  
element units**



**128 panels**



**DAQ**



**Utility Distribution Units**

# AMISR Project

Manage like a research project with  
production component

# AMISR Project- Manage like a research project with production component

## Research

- specify requirement (not product)
- build

**VS**

## Procurement

- specify product
- COTS

Continuous improvement over the lifecycle of the product as apposed to COTS

# AMISR Project

- Form Technical Advisory Committee
- Generate partnerships with key suppliers
- Generate baseline specifications
- Produce prototypes
- Design verification testing
- Design for manufacturing (DFx)
- Deploy and test prototype AMISR panels
  - Evaluate deployment performance
  - Iterate specifications
    - Enhance performance
    - Minimize cost
- Prepare for volume production
  - Generate approved vendor lists
  - Assemble automatic test hardware and software
- Site Prep and construction
- Final testing

# AMISR Project-Manage like a research project with production component

- Form Technical Advisory Committee





## AMISR Project- Manage like a research project with production component

- Form Technical Advisory Committee
- **Generate partnerships with key suppliers**

# AMISR Project- Manage like a research project with production component

**Form strategic partnerships with qualified corporations**



## AMISR Project- Manage like a research project with production component

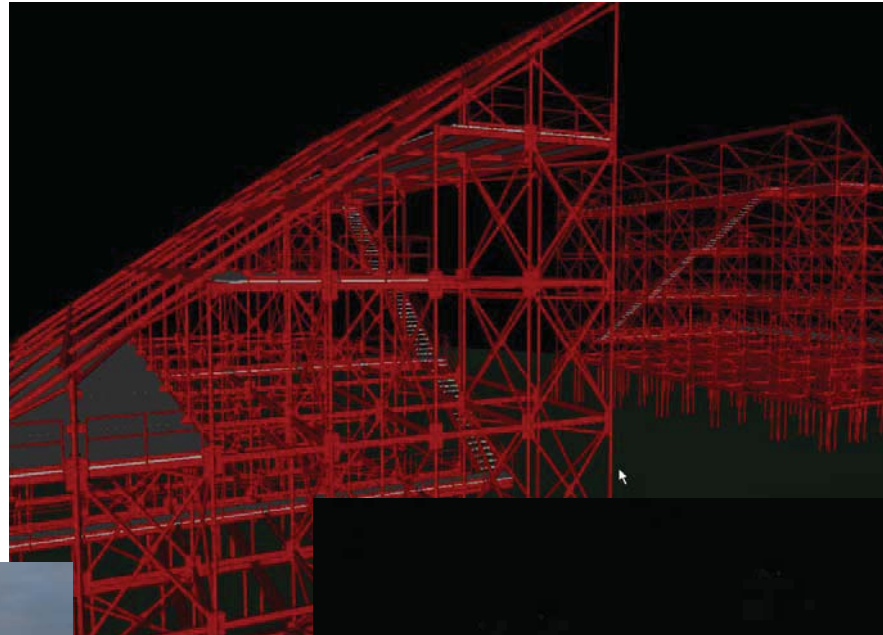
- Form Technical Advisory Committee
- Generate partnerships with key suppliers
- Generate baseline specifications
- Produce and evaluate first level prototypes



# AEU and PCU Development



# Structure Prototype

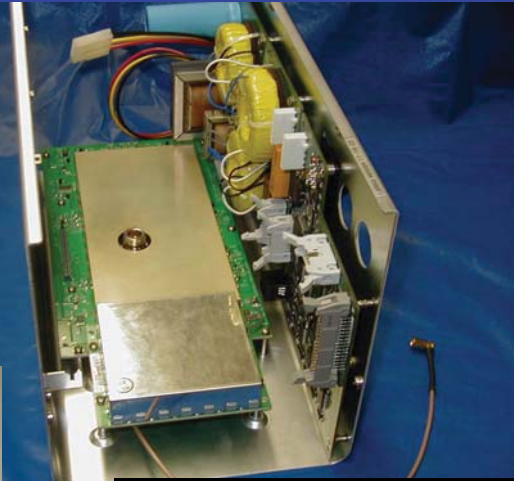
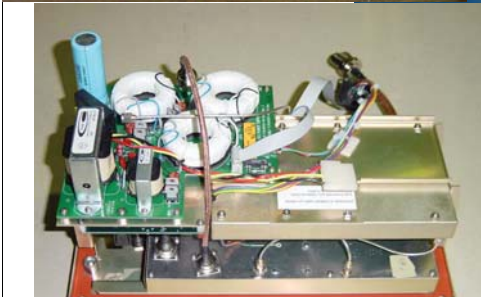


## AMISR Project- Manage like a research project with production component

- Form Technical Advisory Committee
- Generate partnerships with key suppliers
- Generate baseline specifications
- Produce and evaluate first level prototypes
- Design for manufacturing (DFx)



# Design for Manufacturing Antenna element unit



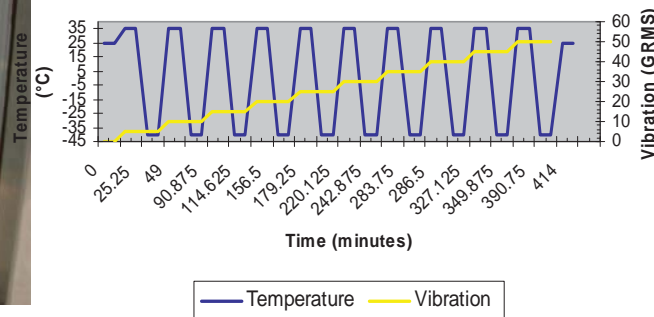
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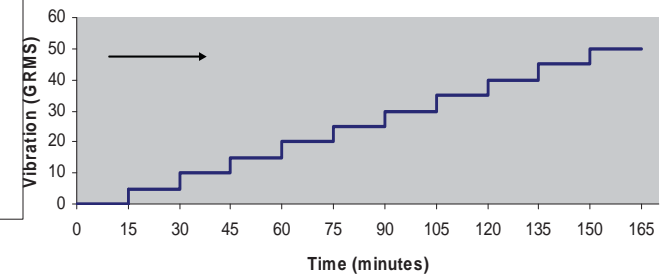
# Sanmina—AEU Design Verification Test (Shake 'n Bake)



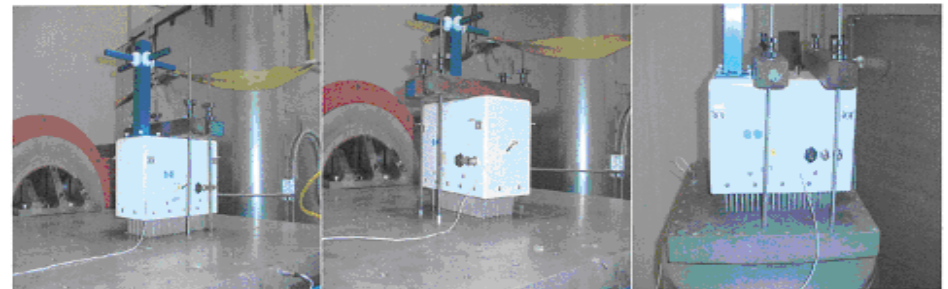
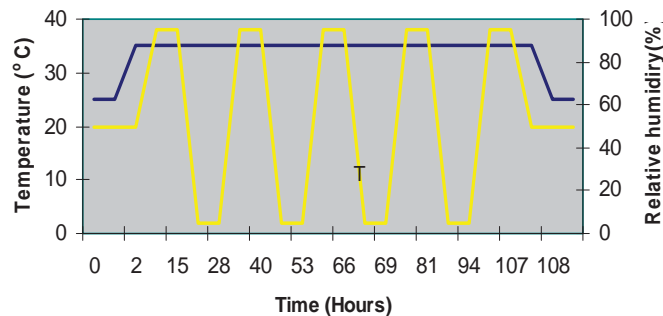
Figure 4 Rapid Thermal Cycling and Step Stress Random Vibration



Step Stress Random Vibration



Humidity Cycling



X---Axis

Y---Axis

Z---Axis



# Data Acquisition Prototype



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- Generate baseline specifications
- Produce and evaluate first level prototypes
- Design for manufacturing (DFx)
- Design verification testing
- Deploy and test AMISR prototype systems
  - Evaluate deployment performance
  - Iterate specifications
    - Enhance performance
    - Minimize cost

# AMISR Project- Deploy and Test 8 Panel Prototypes



Jicamarca

Gakona (HAARP)

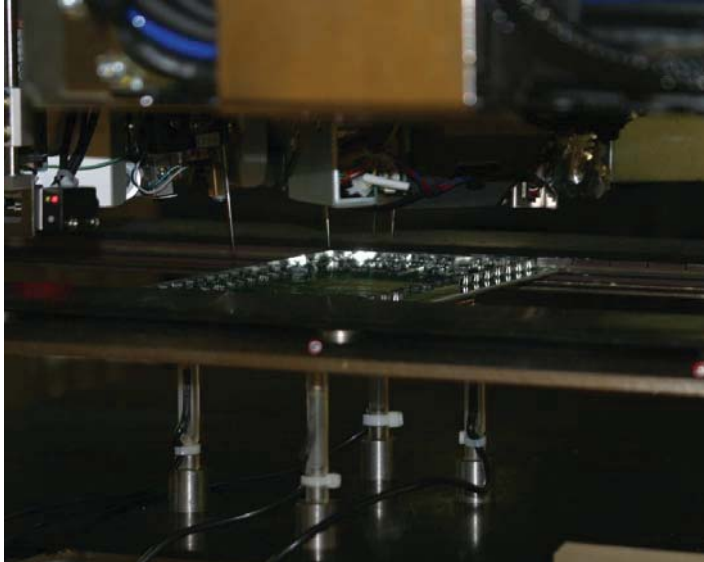
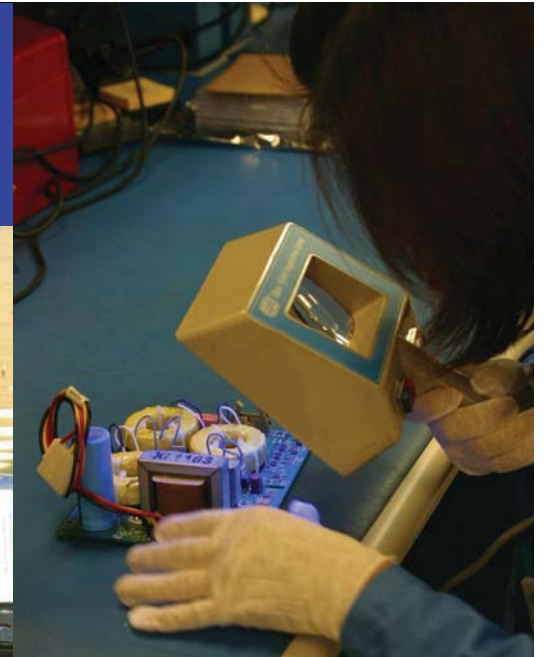


## AMISR Project- Manage like a research project with production component

- Form Technical Advisory Committee
- Generate partnerships with key suppliers
- Generate baseline specifications
- Produce prototypes
- Design for manufacturing (DFx)
- Design verification testing
- Deploy and test prototype AMISR 8 panels
  - Evaluate deployment performance
  - Iterate specifications
    - Enhance performance
    - Minimize cost
- Prepare for volume production



# Sanmina Production



# AMISR Project- Volume Production

- Each AMISR sub-assembly is treated as a single product
- Each product has a negotiated fixed price
- Take advantage of large volume discounts
- SRI provides the designs, BOMs and testing systems
- Contract manufacturer assembles the product and ships it to SRI
- AMISR sub-assemblies were manufactured at local facility, within a short drive
  - Ability to resolve problems instantaneously
  - One-on-one negotiations

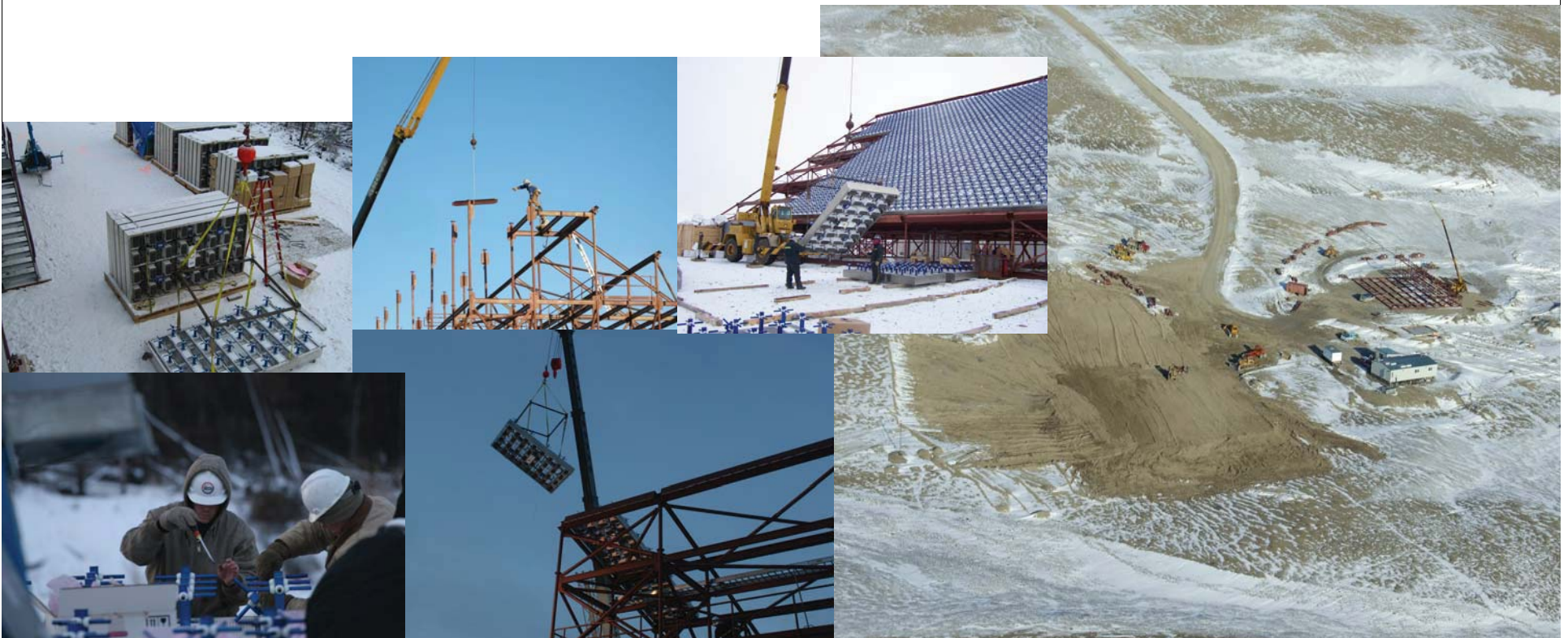
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    - Minimize cost
- Prepare for volume production
- Construction and Logistics



# AMISR Project- Construction

- Use the same methodology for construction that was used for manufacturing the sub-assemblies
- SRI provided the designs, BOMS, testing system and sub-assemblies, and contracted the assembly of the radar





# AMISR Project

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# AMISR Project- Transition to O&M

- Acceptance Test
  - NASA Rocket Campaign occurred during the end of AMISR construction at Poker Flat
- AMISR development doesn't have a well defined end point
  - Evolves continuously as modes and user requirements become more sophisticated
- Simulate O&M conditions
  - Develop sufficient modes for initial operations

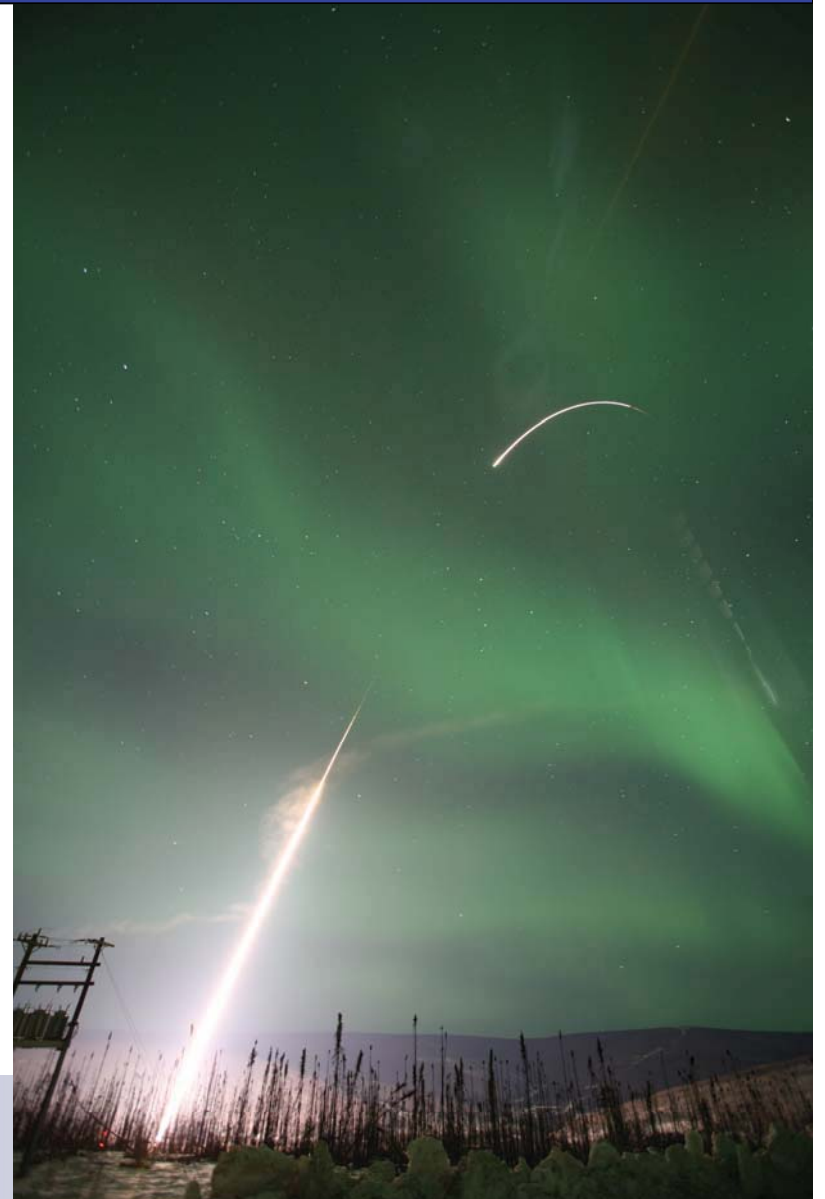


Photo by C. Heinselman

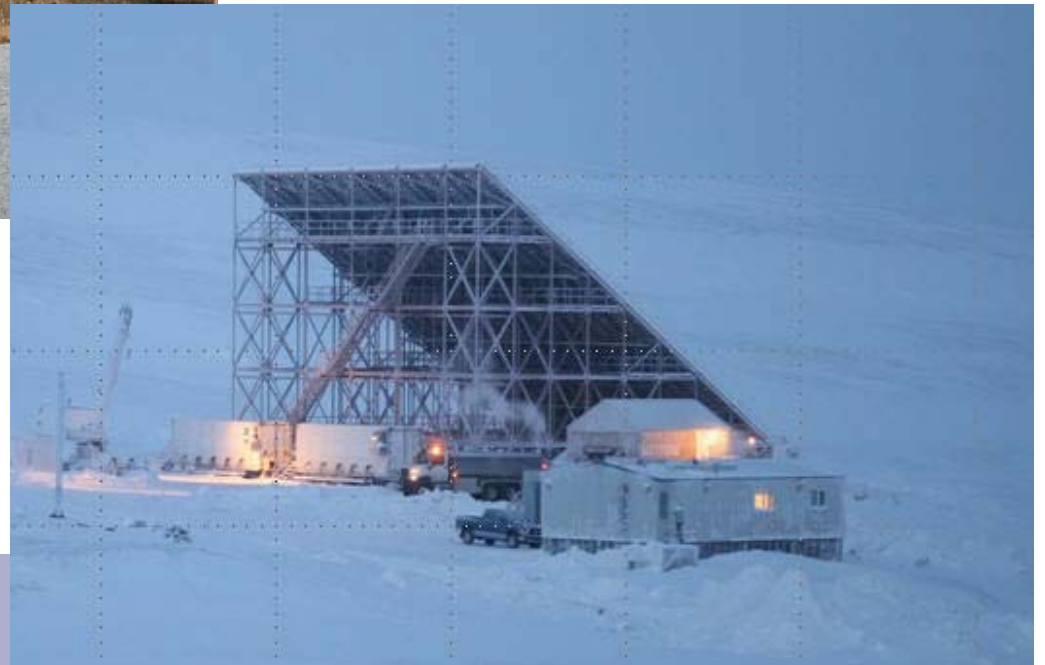
# Lessons learned / Challenges 2003 - 2008

- Vendor performance
  - Need to include more time in the schedule for “vendor mishaps”
  - Need savvy procurement agents
- What is available today may not be available tomorrow
  - Include additional time and money for managing obsolete parts during design and manufacturing
- An Engineer’s job is never done
  - You have to draw a line in the sand
- Meeting the needs & expectations of the Client, Science Community, Technical Advisors, Team members, Vendors
  - Making the final decision
  - Evaluating trade-offs
  - Obtaining NSF concurrence

# AMISR Project- Distributed facility – PFISR & RISR



Single management point for  
multiple independent facilities  
“current configuration”





# Best Practices

- Preferred vendor list specifically for AMISR
  - Strategic partners
  - Weekly meeting or more often when needed
  - Negotiated prices
  - Monitored parts list
    - Provides parts obsolescence management
- Engineering
  - Identify champions and give them ownership / responsibility / budget / schedule
  - Weekly status meetings
- Procurement
  - Team members
  - Dedicated, negotiation trained, procurement agent & subcontract mgr.
  - Weekly meeting or more often when needed